

REMARKS

Claims 13-22 are pending in this application. Reconsideration of the rejections in view of these amendments and the following remarks is respectfully requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with Markings to Show Changes Made.**"

(1)(i) The specification was objected since it is not clear how a saturated hydrocarbon polymer can have at least one alkenyl group within its molecule. Amendment of "a saturated hydrocarbon polymer" into "a hydrocarbon polymer" in the specification is believed to overcome the outstanding objection.

(ii) Claims 13, 14, and 18-21 were objected for including the reference of components (B), (C), (D), (E), (F), and (G). Claims 13, 14, and 18-21 have been amended for clarity to overcome the objection.

(2)(i) Claims 13-22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto et al. (6,451,439 B2).

Contrary to the examiner's statement that the claimed limitation of "a curable composition comprising a hydrocarbon polymer having at least one alkenyl group per molecule" is disclosed in Okamoto et al., it is not supported by Okamoto et al. Okamoto et al. only discloses sealing

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compositions of the modified silicone type, silicone type, polyurethane type, acrylic urethane type, polysulfide type, modified polysulfide type, butyl rubber type, acrylic type, SBR type or fluorine-containing type, oil-based caulking compounds, silicone-based mastics, and sealing compositions comprising, as the main component, a saturated hydrocarbon polymer having the reactive silicon group at col. 15, line 44 to col. 16, line 12. Prima facie obviousness requires a reasonable expectation of success. "Obvious to try" a modification of reference does not establish prima facie obviousness. Therefore, claim 13 is not obvious over Okamoto et al.

In addition, the examiner, in connection with claim 18, stated that Okamoto et al. disclose the recitation of "wherein the composition comprises a polyvalent alkoxysilane and/or a condensation product thereof (col. 3, line 18 to col. 4, line 2). However, these compounds disclosed in Okamoto et al. are merely monomers for producing a polymer and are not disclosed as the components of the compositions.

(ii) Claims 13 and 14 were rejected under 35 U.S.C. 103(a) as being unpatentable over DeLouise et al. (6,273,985 B1).

The polymers disclosed in DeLouise et al. have polyether structure, so DeLouise et al. does not disclose a hydrocarbon polymer (See claim 6 of DeLouise et al.). Therefore, DeLouise et al. does not disclose or suggest the claimed limitation of "a hydrocarbon polymer having at least one alkenyl group per molecule." Again, prima facie obviousness requires a reasonable expectation of success. "Obvious to try" a modification of a reference does not establish prima facie obviousness.

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(3) It is respectfully submitted that nothing in the cited references, taken either alone or in combination, teaches or suggests all the features recited in each claim of the present invention. Thus all pending claims are in condition for allowance. Reconsideration of the rejections, withdrawal of the rejections and an early issue of a Notice of Allowance are earnestly solicited.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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PATENT TRADEMARK OFFICE

Enclosures: Version with markings to show changes made

IN THE SPECIFICATION:

The paragraph beginning at page 1, line 4, has been amended as follows:

The present invention relates to a primer composition effective in bonding an addition reaction type [saturated] hydrocarbon polymer securely to various substrates. More particularly, the invention relates to a primer technology for achieving improved bonds to substrates and a technology of improving the adhesion of an addition type cured product which comprises coating a primer on a substrate and then applying an addition reaction type curable composition comprising a [saturated] hydrocarbon polymer thereon and letting it cure in situ.

The paragraph beginning at page 1, line 16, has been amended as follows:

A curable resin (also known as an addition type curable composition) in which a [saturated] hydrocarbon polymer containing at least one alkenyl group within its molecule is crosslinked with a curing agent having two or more silicon-bound hydrogen atoms per molecule has been disclosed in Japanese Kokai Publication Hei-2-75644 and Japanese Kokai Publication Hei-3-181565, for instance. The cured product derived from such a composition (which artifact is also known as an addition type cured product) has excellent weather resistance, high heat resistance and low moisture permeability and, therefore, is expected to find application in a broad spectrum of end uses.

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The paragraph beginning at page 1, line 27, has been amended as follows:

Particularly when an addition type curable composition comprising a [saturated] hydrocarbon polymer is used as a coating or dipping agent or a sealant for various substrates, it must have a high adhesiveness for the various substrates. The known technology of imparting adhesiveness to such an addition type curable composition comprising a [saturated] hydrocarbon polymer involves addition of various adhesion-improving agents to an addition type curable composition. By way of illustration, Japanese Kokai Publication Hei-4-185687 discloses a technique comprising adding a silane coupling agent to an addition type curable composition; Japanese Kokai Publication Hei-08-134165 discloses a technique comprising adding a nitrogen-containing epoxy compound and a silane coupling agent; Japanese Kokai Publication Hei-08-134165 discloses a technique comprising adding an isocyanate-containing compound and a silane coupling agent; Japanese Kokai Publication Hei-09-316293 and Japanese Kokai Publication Hei-10-204222 disclose a technology comprising adding a silane coupling agent, an alkoxysilane condensate and an organoaluminum and/or organotitanium compound. These techniques have the disadvantage, inter alia, that, depending on the kind of silane coupling agent, a retardation of cure may take place.

The paragraph beginning at page 2, line 16, has been amended as follows:

The object of the invention is to provide a primer composition which is effective in achieving a firm bond between a various substrate and a cured product derived from a hydrosilylation-curable composition comprising a [saturated] hydrocarbon polymer containing at least one alkenyl group per molecule and a curing agent having two or more hydrogen atoms bound to silicon per molecule and to provide a bonding method.

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The paragraph beginning at page 2, line 23, has been amended as follows:

Landing on a concept representing a complete departure from the prior art, the inventors of the present invention discovered that an addition type curable composition comprising a [saturated] hydrocarbon polymer containing at least one alkenyl group per molecule and a curing agent having two or more hydrogen atoms bound to silicon per molecule and a cured product derived therefrom can be bonded to various substrates by utilizing a primer composition.

The paragraph beginning at page 2, line 31, has been amended as follows:

The present invention, therefore, is concerned with a primer composition comprising the following (A), (B), (C) and (D) components:

- (A) a [saturated] hydrocarbon polymer containing at least one alkenyl group per molecule
- (B) a silane coupling agent
- (C) a polyvalent alkoxysilane and/or a condensation product thereof, and
- (D) an organoaluminum compound and/or an organotitanium compound.

The paragraph beginning at page 3, line 31, has been amended as follows:

A further preferred composition comprises a [saturated] hydrocarbon polymer containing at least one alkenyl group per molecule, that is said (A) component, in addition to said (B) to (E) components.

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The paragraph beginning at page 4, line 4, has been amended as follows:

More preferably, in this invention, the (A) component [saturated] hydrocarbon polymer is a polyisobutylene polymer having a number average molecular weight in the range of 500 to 50000 and containing at least one alkenyl group terminally of its backbone and/or side chain.

The paragraph beginning at page 4, line 17, has been amended as follows:

The present invention is further directed to a bonding method for bonding a cured product to a substrate

which comprises coating a primer composition comprising a silane coupling agent as said (B) component on a substrate

and then applying a curable composition comprising a [saturated] hydrocarbon polymer having at least one alkenyl group per molecule onto the primed substrate.

The paragraph beginning at page 4, line 31, has been amended as follows:

The invention is further concerned with a bonding method for bonding a cured product to a substrate

which comprises coating a primer composition comprising a polyvalent alkoxysilane and/or a condensation product thereof as (C) component and an organoaluminum compound and/or an organotitanium compound as (D) component on a substrate

and then applying a curable composition comprising a [saturated] hydrocarbon polymer having at least one alkenyl group per molecule to the primed substrate.

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The paragraph beginning at page 5, line 5, has been amended as follows:

Preferably, in this invention, said [saturated] hydrocarbon polymer having at least one alkenyl group per molecule is a polyisobutylene polymer containing at least one alkenyl group terminally of its backbone and/or side chain and having a number average molecular weight in the range of 500 to 50000.

The paragraph beginning at page 5, line 23, has been amended as follows:

The (A) component for use in the invention is a [saturated] hydrocarbon polymer having at least one hydrosilylatable alkenyl group within its molecule. The hydrosilylatable alkenyl group is not particularly restricted as far as it is a group containing a carbon-carbon double bond active for hydrosilylation. As such alkenyl groups, there may be mentioned aliphatic unsaturated hydrocarbon groups such as vinyl, allyl, methylvinyl, propenyl, butenyl, pentenyl, hexenyl, etc. and cyclic unsaturated hydrocarbon groups such as cyclopropenyl, cyclobutenyl, cyclopentenyl, cyclohexenyl and so on. In the present invention, the (A) component preferably has 1 to 10 alkenyl groups per molecule.

The paragraph beginning at page 5, line 35, has been amended as follows:

The polymer constituting the backbone of the (A) component [saturated] hydrocarbon polymer can be prepared by, for example,

(1) polymerizing an olefinic compound containing 1 to 6 carbon atoms, such as ethylene, propylene, 1-butene, isobutylene and the like, as a main monomer or

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(2) homopolymerizing a diene compound, such as butadiene, isoprene and the like, or copolymerizing said olefinic compound with said diene compound, followed by hydrogenation. In terms of the ease with which a functional group may be introduced terminally of the polymer, the molecular weight of the polymer be well controlled, and the number of terminal functional groups be increased, an isobutylene polymer, a hydrogenated polybutadiene polymer or a hydrogenated polyisoprene polymer is preferred.

The paragraph beginning at page 7, line 3, has been amended as follows:

The hydrogenated polybutadiene polymer or other [saturated] hydrocarbon polymer may also contain unit monomers other than the main monomer just as said isobutylene polymer.

The paragraph beginning at page 7, line 6, has been amended as follows:

The [saturated] hydrocarbon polymer for use as (A) component in the invention may be prepared using a monomer component leaving a double bond after polymerization, such as a polyene compound, e.g. butadiene, isoprene or the like, in a proportion not jeopardizing the object of the invention, i.e. in a small proportion, preferably within the range of not more than 10%.

The paragraph beginning at page 7, line 13, has been amended as follows:

The [saturated] hydrocarbon polymer, preferably an isobutylene polymer, a hydrogenated polyisoprene polymer or a hydrogenated polybutadiene polymer, preferably has a number average molecular weight (GPC method; polystyrene equivalent) of not more than 100000, more preferably about 500 to 100000. In consideration of the ease of handling, a liquid polymer having sufficient fluidity with a molecular weight of about 1000 to 40000 is particularly preferred.

The paragraph beginning at page 12, line 11, has been amended as follows:

The vinyl monomer mentioned just above is not particularly restricted but includes, among others, esters of unsaturated carboxylic acids, such as methyl (meth)acrylate, ethyl (meth)acrylate, n-butyl (meth)acrylate, isobutyl (meth)acrylate, t-butyl (meth)acrylate, 2-ethylhexyl (meth)acrylate, lauryl (meth)acrylate, stearyl (meth)acrylate, benzyl (meth)acrylate, cyclohexyl (meth)acrylate, trifluoroethyl (meth)acrylate, pentafluoropropyl (meth)acrylate, diesters or hemiesters of polycarboxylic acids (maleic acid, fumaric acid, itaconic acid, etc.) with a straight-chain or branched-chain alcohols containing 1 to 20 carbon atoms, etc.; aromatic hydrocarbon type vinyl compounds such as styrene, α -methylstyrene, chlorostyrene, styrenesulfonic acid, 4-hydroxystyrene, vinyltoluene, etc.; vinyl esters and allyl compounds, such as vinyl acetate, vinyl propionate, diallyl phthalate, etc.; nitrile-containing vinyl compounds such as (meth)acrylonitrile; epoxy-containing vinyl compounds such as glycidyl (meth)acrylate; amino-containing vinyl compounds such as dimethylaminoethyl (meth)acrylate, diethylaminoethyl (meth)acrylate, vinylpyridine, aminoethyl vinyl ether, etc.; amido-containing vinyl compounds such as (meth)acrylamide, itaconic acid diamide, α -ethylacrylamide, methacrylamide, crotonamide, maleic acid diamide, fumaric acid diamide, N-vinylpyrrolidone, N-butoxymethyl(meth)acrylamide, N,N-dimethylacrylamide, N-methylacrylamide, acryloylmorpholine, etc.; hydroxy-containing vinyl compounds such as 2-hydroxyethyl (meth)acrylate, 2-hydroxypropyl (meth)acrylate, 2-hydroxyethyl vinyl ether, N-methylol(meth)acrylamide, Aronix 5700 (product of Toa Gosei Chemical Industry Co.), Placel FA-1, Placel FA-4, Placel FM-1, Placel FM-4 (products of Daicel Chemical Co.), etc.; unsaturated carboxylic acids and acid anhydrides, inclusive of their salts, such as (meth)acrylic acid, maleic acid, fumaric acid, itaconic acid, etc., salts thereof (alkali metal salts, ammonium salts, amine salts, etc.), maleic anhydride, etc.; and other vinyl compounds such as vinyl methyl ether, vinyl chloride, vinylidene chloride, chloroprene, propylene,

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butadiene, isoprene, maleimide, N-vinylimidazole, vinylsulfonic acids and so on. Among these, alkyl (meth)acrylates containing 10 or more carbon atoms, such as lauryl (meth)acrylate and stearyl (meth)acrylate, are still more preferred because they provide for coats having a good affinity even for a low-polarity curable composition containing a [saturated] hydrocarbon polymer.

The paragraph beginning at page 17, line 3, has been amended as follows:

The curable composition which can be advantageously used in combination with the primer composition of the present invention comprises a [saturated] hydrocarbon polymer having at least one alkenyl group per molecule. It preferably comprises a curing agent as well.

The paragraph beginning at page 17, line 8, has been amended as follows:

The above-mentioned [saturated] hydrocarbon polymer having at least one alkenyl group per molecule may be one similar to the (A) component of the primer composition of the invention.

The paragraph beginning at page 18, line 2, has been amended as follows:

Among the various hydrosilyl-containing groups mentioned above, the following group is particularly preferred in view of the low likelihood of reducing the compatibility of the hydrosilyl-containing curing agent of the invention with the [saturated] hydrocarbon polymer.

The paragraph beginning at page 19, line 12, has been amended as follows:

In the curable composition to be used in accordance with the invention, the molar ratio of the alkenyl group in the [saturated] hydrocarbon polymer to the hydrosilyl group in the curing agent is generally 1:0.5 to 1:5, preferably 1:0.8 to 1:3, still more preferably 1:1 to 1:2.5.

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The paragraph beginning at page 20, line 3, has been amended as follows:

The bonding method of the invention includes the following mode, among others.

- (1) The primer composition is first coated on the surface of a substrate and the primer is cured within a temperature range of room temperature to 150 °C for 1 minute to 60 minutes.
- (2) Then, on the primed surface, an addition type curable composition comprising a [saturated] hydrocarbon polymer is coated and cured in situ under the curing conditions specific to the particular addition type curable composition of this [saturated] hydrocarbon polymer.

The paragraph beginning at page 29, line 4, has been amended as follows:

Thus, the present invention provides a bonding method insuring a remarkably improved adhesion of an addition type curable [saturated] hydrocarbon polymer composition to various substrates.

IN THE CLAIMS:

Claims 13, 14 and 18-21 have been amended as follows:

13. (Twice Amended) A bonding method for bonding a cured product to a substrate which comprises coating a primer composition comprising a silane coupling agent [~~as (B)~~ component] on a substrate, .
applying a curable composition comprising a hydrocarbon polymer having at least one alkenyl group per molecule onto the primed substrate, and
curing the curable composition to obtain the cured product bonded to the substrate.

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14. (Amended) The bonding method according to claim 13

wherein the [~~(B)~~ component] silane coupling agent has at least one functional group selected from the group consisting of epoxy, vinyl and (meth)acryloyl groups.

18. (Twice Amended) The bonding method according to Claim 13 or 14

wherein said primer composition comprises a polyvalent alkoxysilane and/or a condensation product thereof [~~as (C) component~~].

19. (Twice Amended) The bonding method according to Claim 13 or 14

wherein said primer composition comprises an organoaluminum compound and/or an organotitanium compound [~~as (D) component~~].

20. (Twice Amended) The bonding method according to Claim 13 or 14

wherein said primer composition comprises a hydrosilylation catalyst [~~as (F) component~~].

21. (Twice Amended) The bonding method according to Claim 13 or 14

wherein said primer composition comprises an organic solvent [~~as (G) component~~].